

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims

1. (Previously Presented) A nanowhisker comprising: a column with a diameter of nanometer dimension,
the column including along its length at least first and second lengthwise segments of different crystalline materials with a composition boundary between the first and second segments, wherein said diameter of said column is such that lattice strain caused by lattice mismatch at the composition boundary is substantially accommodated by lateral outward atomic displacement and wherein the composition boundary between the crystalline materials of the first and second segments extends over an axial interval of not more than 10 diametral lattice planes.
2. (Withdrawn) A nanowhisker according to claim 1, wherein the diameter of the column is substantially constant along the length of the column.
3. (Withdrawn) A nanowhisker according to claim 1, wherein the nanowhisker is tapered such that the diameter changes in a controlled manner along the length of the column.
4. (Withdrawn) A nanowhisker according to claim 1, wherein the diameter of the column is such that the nanowhisker exhibits quantum confinement effects.
5. (Withdrawn) A nanowhisker according to claim 1, wherein the nanowhisker further comprises a catalytic particle at one end.
6. (Previously Presented) A nanowhisker according to claim 1, wherein the composition boundary between the crystalline materials of the first and segments extends over an axial interval of not more than 3 diametral lattice planes.

7. (Withdrawn) A nanowhisker according to claim 1, wherein the materials of the first and second segments are semiconductor III-V materials.

8. (Previously Presented) An array comprising a plurality of nanowhiskers according claim 1, extending parallel to one another.

Claims 9-16 (Cancelled).

17. (Previously Presented) A nanowhisker comprising: a column with a diameter of nanometer dimension,
the column including along its length at least first and second lengthwise segments of different crystalline materials with a diametral material boundary between the first and second segments, said material boundary defined by a transition between said different crystalline materials occurring within an axial interval of not more than ten diametral lattice planes.

18. (Withdrawn) A nanowhisker according to claim 17, wherein the diameter of the column is constant along the column.

19. (Withdrawn) A nanowhisker according to claim 17, wherein the nanowhisker is tapered to provide a diameter which changes in a controlled manner along the column.

20. (Withdrawn) A nanowhisker according to claim 17, wherein the diameter of the nanowhisker is such that the nanowhisker exhibits quantum confinement effects.

21. (Withdrawn) A nanowhisker according to claim 17, wherein the nanowhisker further comprises a catalytic particle at one end.

22. (Previously Presented) A nanowhisker according to claim 17, wherein the material boundary between the crystalline materials of the first and second segments extends over an axial interval of not more than 3 lattice planes.

23. (Withdrawn) A nanowhisker according to claim 17, wherein the materials of the first and second segments are semiconductor III-V materials.

24. (Previously Presented) An array comprising a plurality of nanowhiskers according to claim 17, extending parallel to one another.

Claims 25-93 (Cancelled).

94. (Previously Presented) A nanowhisker comprising,
a column having a longitudinal axis, said column having a length along said axis and at least one dimension perpendicular to said axis, said dimension perpendicular to said axis not exceeding about 500 nm;

said column comprising at least:

a first lengthwise segment of a first crystalline semiconductor material having a first composition; and

a second lengthwise segment of a second crystalline semiconductor material having a second composition,

said first lengthwise segment and said second lengthwise segment being in contact at an interface,

said interface constituting a junction at which said first composition changes to said second composition within an axial distance of not greater than 10 diametral lattice planes.

95. (Withdrawn) A nanowhisker according to claim 94, wherein said at least one dimension perpendicular to said axis does not exceed about 100 nm.

96. (Withdrawn) A nanowhisker according to claim 94, wherein said at least one dimension perpendicular to said axis does not exceed about 50 nm.

97. (Withdrawn) A nanowhisker according to claim 94, wherein said at least one dimension perpendicular to said axis does not exceed about 30 nm.

98. (Withdrawn) A nanowhisker according to claim 94, wherein said at least one dimension perpendicular to said axis does not exceed about 20 nm.

99. (Withdrawn) A nanowhisker according to claim 94, wherein said at least one dimension perpendicular to said axis does not exceed about 10 nm.

100. (Withdrawn) A nanowhisker according to claim 94, wherein said at least one dimension perpendicular to said axis does not exceed about 5 nm.

Claims 101-104 (Cancelled)

105. (Withdrawn) A nanowhisker according to claim 94, wherein said first composition changes to said second composition within an axial distance of not greater than 3 diametral lattice planes.

106. (Withdrawn) A nanowhisker according to claim 94, wherein said first composition changes to said second composition within an axial distance of not greater than 2 diametral lattice planes.

107. (Withdrawn) A nanowhisker according to claim 94, wherein said first composition changes to said second composition within an axial distance of not greater than 1 diametral lattice plane.

108. (Withdrawn) A nanowhisker according to claim 94, wherein said column has a generally circular or polygonal cross-section and said at least one dimension perpendicular to said axis of said column is a diameter thereof.

109. (Withdrawn) A nanowhisker according to claim 108, wherein said diameter of said column is generally constant along said axis of said column.

110. (Withdrawn) A nanowhisker according to claim 108, wherein said column is tapered, whereby said diameter of said column decreases along said axis of said column.

111. (Withdrawn) A nanowhisker according to claim 108, wherein said diameter of said column is such that at least a portion of said length of said column along said axis exhibits quantum confinement effects.

112. (Withdrawn) A nanowhisker according to claim 94, wherein said column additionally comprises a catalytic particle integral with an end thereof.

113. (Withdrawn) A nanowhisker according to claim 94, wherein said first and second crystalline materials are selected from the group consisting of III-V semiconductor materials.

114. (Previously Presented) An array of nanowhiskers comprising a plurality of nanowhiskers according to claim 94, extending parallel to one another.

115. (Original) An array of nanowhiskers according to claim 114, wherein each of said nanowhiskers is attached to a substrate at an end thereof.

116. (Withdrawn) A nanowhisker according to claim 94, wherein said first crystalline semiconductor material has a stoichiometric composition of the form $A_{1-x}B_xC$ and said second crystalline semiconductor material has a stoichiometric composition of the form $A_{1-x}B_xC$, where A, B, and C are selected elements and x and y are different numbers in the range from 0 to 1.

117. (Withdrawn) A nanowhisker according to claim 116, wherein said elements A and B are Group III semiconductors and said element C is a Group V semiconductor.

118. (Withdrawn) A nanowhisker according to claim 94, wherein said first and second crystalline semiconductor materials are selected to produce a predetermined band gap change at said junction.

119. (Previously Presented) A nanowhisker comprising,
a column having a longitudinal axis, said column having a length along said axis and at least one dimension perpendicular to said axis;

said column comprising at least:

a first lengthwise segment of a first crystalline semiconductor material having a first composition and a first crystal lattice; and

a second lengthwise segment of a second crystalline semiconductor material having a second composition and a second crystal lattice,

said first lengthwise segment and said second lengthwise segment being in contact at an interface, said interface constituting a junction at which said first composition changes to said second composition within an axial distance of not greater than 10 diametral lattice planes.

said dimension perpendicular to said axis being such that lattice strain caused by lattice mismatch between said first crystal lattice and said second crystal lattice at said interface between said first lengthwise segment and said second lengthwise segment can be substantially accommodated by lateral atomic displacement.

Claims 120-123 (Cancelled)

124. (Withdrawn) A nanowhisker according to claim 119, wherein said first composition changes to said second composition within an axial distance of not greater than 3 diametral lattice planes.

125. (Withdrawn) A nanowhisker according to claim 119, wherein said first composition changes to said second composition within an axial distance of not greater than 2 diametral lattice planes.

126. (Withdrawn) A nanowhisker according to claim 119, wherein said first composition changes to said second composition within an axial distance of not greater than 1 diametral lattice plane.

127. (Withdrawn) A nanowhisker according to claim 119, wherein said column has a generally circular or polygonal cross-section and said at least one dimension perpendicular to said axis of said column is a diameter thereof.

128. (Withdrawn) A nanowhisker according to claim 127, wherein said diameter of said column is generally constant along said axis of said column.

129. (Withdrawn) A nanowhisker according to claim 127, wherein said column is tapered, whereby said diameter of said column decreases along said axis of said column.

130. (Withdrawn) A nanowhisker according to claim 127, wherein said diameter of said column is such that at least a portion of said length of said column along said axis exhibits quantum confinement effects.

131. (Withdrawn) A nanowhisker according to claim 119, wherein said column additionally comprises a catalytic particle integral with an end thereof.

132. (Withdrawn) A nanowhisker according to claim 119, wherein said first and second crystalline materials are selected from the group consisting of III-V semiconductor materials.

133. (Previously Presented) An array of nanowhiskers comprising a plurality of nanowhiskers according to claim 119, extending parallel to one another.

134. (Original) An array of nanowhiskers according to claim 133, wherein each of said nanowhiskers is attached to a substrate at an end thereof.

135. (Withdrawn) A nanowhisker of claim 119, wherein said first crystalline semiconductor material has a stoichiometric composition of the form $A_{1-x}B_xC$ and said second crystalline semiconductor material has a stoichiometric composition of the form $A_{1-y}B_yC$, where A, B, and C are selected elements and x and y are different numbers in the range from 0 to 1.

136. (Withdrawn) A nanowhisker according to claim 135, wherein said elements A and B are Group III semiconductors, and said element C is a Group V semiconductor.

137. (Withdrawn) A nanowhisker according to claim 119, wherein said first and second crystalline semiconductor materials are selected to produce a predetermined band gap change at said junction.

Claims 138-140 (Cancelled)

141. (Withdrawn) A nanowhisker according to claim 17, wherein the material boundary between the crystalline materials of the first and second segments extends over an axial interval of not more than 3 diametral lattice planes.

142. (Withdrawn) A nanowhisker according to claim 17, wherein the material boundary between the crystalline materials of the first and second segments extends over an axial interval of not more than 2 diametral lattice planes.

143. (Withdrawn) A nanowhisker according to claim 17, wherein the material boundary between the crystalline materials of the first and second segments extends over an axial interval of not more than 1 diametral lattice plane.

Claims 144-151 (Cancelled).

152. (New) A nanowhisker according to claim 1, wherein the nanowhisker is incorporated into a device.

153. (New) A nanowhisker according to claim 152, wherein the device comprises a light emitting diode, a transistor, a photonic device, a photodetector, a solar cell, a resonant tunnelling diode, a diode, a single photon light source, an image converter, a field emission display, a spintronic nanowhisker device or a source of terahertz radiation.

154. (New) A nanowhisker according to claim 17, wherein the nanowhisker is incorporated into a device.

155. (New) A nanowhisker according to claim 154, wherein the device comprises a light emitting diode, a transistor, a photonic device, a photodetector, a solar cell, a resonant tunnelling diode, a diode, a single photon light source, an image converter, a field emission display, a spintronic nanowhisker device or a source of terahertz radiation.

156. (New) A nanowhisker according to claim 94, wherein the nanowhisker is incorporated into a device.

157. (New) A nanowhisker according to claim 156, wherein the device comprises a light emitting diode, a transistor, a photonic device, a photodetector, a solar cell, a resonant tunnelling diode, a diode, a single photon light source, an image converter, a field emission display, a spintronic nanowhisker device or a source of terahertz radiation.

158. (New) A nanowhisker according to claim 119, wherein the nanowhisker is incorporated into a device.

159. (New) A nanowhisker according to claim 158, wherein the device comprises a light emitting diode, a transistor, a photonic device, a photodetector, a solar cell, a resonant tunnelling diode, a diode, a single photon light source, an image converter, a field emission display, a spintronic nanowhisker device or a source of terahertz radiation.